

SECTION 15612
GAS DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the test by the basic designation only.

A. Federal Specifications (Fed. Spec.):

L-C-530B(1)	Coating, Pipe, Thermoplastic Resin or Thermosetting Epoxy
L-T-1512A	Tape, Pressure Sensitive Adhesive, Pipe Wrapping
WW-V-35B(1)	Valve, Ball

B. Military Specifications (Mil. Spec.):

MIL-C-18480B	Coating Compound, Bituminous, Solvent, Coal Tar Base
MIL-T-27730A	Tape, Antiseize, Tetrafluoroethylene, with Dispenser

C. American National Standards Institute (ANSI) Publications:

A21.14-79	Ductile-Iron Fittings, 3-inch through 24-inch for Gas
A21.52-82	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Gas
B16.1-75	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
B16.5-81	Steel Pipe Flanges, Flanged Valves and Fittings Including Ratings for Class 150, 300, 400, 600, 900, 1500, and 2500
B16.9-78	Factory-Made Wrought Steel Buttwelding Fittings
B16.11-80	Forged Steel Fittings, Socket-Welding and Threaded
B31.8-82	Gas Transmission and Distribution Piping Systems

D. American Petroleum Institute (API) Publications:

5L-83	Specification for Line Pipe
6D-82	Specification for Pipeline Valves
1104-83	Standard for Welding Pipe Lines and Related Facilities

- E. American Society of Mechanical Engineers (ASME) Publication:
- | | |
|-------------|--------------------------|
| PTC 25.3-76 | Safety and Relief Valves |
|-------------|--------------------------|
- F. American Society for Testing and Materials (ASTM) Publications:
- | | |
|--------------------|---|
| A 53-82 | Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless Steel Pipe |
| A 135-79 | Electric-Resistance-Welded Steel Pipe |
| A 139-74 | Electric-Fusion (ARC)-Welded Steel Pipe (Sizes 4 inch and over) |
| D 1598-81 | Time-to-failure of Plastic Pipe under Constant Internal Pressure, Test Method for |
| D 1599-82 | Short-Time Rupture Strength of Plastic Pipe, Tubing, and Fittings, Method of Test for |
| D 2513-82 | Thermoplastic Gas Pressure Pipe, Tubing and Fittings |
| D 2517-81 | Reinforced Epoxy Resin Gas Pressure Pipe and Fittings |
| D 2774-72 (R 1978) | Underground Installation of Thermoplastic Pressure Piping |
| D 3839-79 | Underground Installation of Flexible Reinforced Thermosetting Resin Pipe and Reinforced Plastic Mortar Pipe |
- G. American Water Works Association (AWWA) Publications:
- | | |
|----------------|--|
| C111/A21.11-80 | Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings |
| C203-78 | Coal Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied |
| C600-82 | Installation of Ductile-Iron Water Mains and Their Appurtenances |
- H. Manufacturer's Standardization Society of the Valve and Fitting Industry (MSS-SP) Publication:
- | | |
|------------|-----------------------|
| SP 78-1977 | Cast Iron Plug Valves |
|------------|-----------------------|
- I. Steel Structures Painting Council (SSPC) Painting Manual, Vol 2 (1982):
- | | |
|---------------|--|
| SSPC-SP3 | Power Tool Cleaning |
| SSPC-Paint 11 | Red Iron Oxide, Zinc Chromate, Raw Linseed Oil, and Alkyd Primer |

1.2 GENERAL REQUIREMENTS: Section 15000, "Mechanical General Requirements", applies to this section except where otherwise specified.

- A. Gas Distribution System: The system includes piping and appurtenances from point of connection with existing system as indicated to a point approximately 5 feet from the building(s).
- B. Gas Distribution Mains: Piping for gas distribution mains shall be black steel, thermoplastic (Polyethylene - PE, as specified. Provide shut off valves where indicated.
- C. Gas Service Lines: Gas service lines shall include the pipelines from the gas distribution mains to the building service at a point approximately 5 feet from the building. Gas service lines shall be black steel pipe, or polyethylene (PE) as specified. Terminate each gas service pipeline with a fitting suitable for accepting black steel pipe of the same nominal diameter.

1.3 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Pipe and Pipe Coatings
 - 2. Fittings
 - 3. Joints and Couplings
 - 4. Valves
 - 5. Valve Boxes
 - 6. Reinforcing Sleeves
 - 7. Tapping Saddles
- B. Test Reports: Certified copies of piping pressure tests.
- C. Certificates of Compliance:
 - 1. Welders procedures and qualifications (metal and PE)
 - 2. Pipe coating materials and application procedure

1.4 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

- A. Delivery and Storage: Inspect materials delivered to the site for damage, and store with a minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

- B. Handling: Handle pipe, fittings, valves, and other accessories in such manner as to insure delivery to the trench in sound, undamaged condition. Take special care not to injure coatings on pipe and fittings. If coatings are damaged, repairs satisfactory to the Contracting Officer shall be made at no extra cost to the Government. Plastic piping that is not to be installed immediately shall not be left in the sunlight.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT: Conform to *ANSI B31.8 to the extent specified herein, and to the respective specifications and the other requirements specified below.

2.2 PIPING MATERIALS FOR GAS DISTRIBUTION MAINS: Piping shall be black steel, PE, as specified below.

- A. Steel Pipe and Fittings: API 5L, Grade A, B, or X42, *ASTM A 53, Grade A or B, *ASTM A 135, or *ASTM A 139, Grade A or B. Coat pipe and fittings for underground lines as specified in paragraph, "Shop-Applied Coatings for Buried Steel Pipe and Fittings". Do not coat pipe and fittings for above ground lines. Ends of pipe and fittings shall be suitable for the joints and jointing materials used. Buttweld fittings shall be wrought steel, *ANSI B16.9. Socket weld and threaded fittings shall be forged steel, ANSI B16.11.

1. Wall Thickness for Pipe and Fittings: The minimum wall thickness for steel pipe and fittings, based upon steel having a minimum specified yield strength of 30,000 psi, shall be equivalent to Schedule 40.

2. Joints and Jointing Materials:

- a. General: Pipe and fittings shall have welded joints [except as otherwise indicated or specified]. Use threaded joints where indicated.

B. Thermoplastic (Polyethylene - PE) Pipe and Fittings:

1. Pipe and Fittings: PE pipe and heat fusion fittings shall conform to *ASTM D 2513, Grade P33 or P34, SDR 13.5. Ends of the pipe and fittings shall be suitable for the joints specified.

2. Joints and Jointing Materials: PE pipe and fittings shall have heat fusion joints, except that approved mechanical crimp-type fittings conforming to paragraph, "Mechanical Crimp-Type Fittings for PE Pipe", may be used for 3/8-inch OD to 2-inch IPS sizes. PE pipe and fitting materials for heat fusion shall be compatible to ensure uniform melting and a proper bond.

C. Mechanical Crimp-Type Fittings for PE Pipe: Axial crimp-type mechanical fittings for 3/8-inch OD thru 2-inch IPS PE tubing and pipe shall be made specifically for use in gas piping systems. Fittings shall have plastic bodies with molded-in-place internal metal sleeves to fit the inside diameter of the pipe and shall be assembled on the pipe with nonremovable stainless steel axial crimping sleeves furnished as part of the fitting. Tensile strength of the fittings and fitting pull-out strength shall exceed that of the pipe on which installed. Fittings shall have passed sustained pressure tests at 200 psig and burst pressure tests at 400 psig conforming to *ASTM Test Methods D 1598 and D 1599 respectively. Test data certifying that fittings of the same type, material, and pressure rating as those being proposed have passed all the above tests, shall be submitted for approval.

2.3 PIPING MATERIALS FOR GAS SERVICE LINES

- A. Steel Pipe, Fittings, Joints and Jointing Materials: Shall be as specified for steel pipe for gas distribution mains. Threaded fittings shall be black malleable iron or steel. Do not install close nipples and unions underground.
- B. PE Pipe and Fittings: PE pipe and heat fusion fittings shall conform to *ASTM D 2513. Minimum wall thickness shall be as specified in *ASTM D 2513. PE pipe and fittings shall have joints as specified for gas distribution main piping.

2.4 GAS MAIN VALVES AND ACCESSORIES

- A. Shut-Off Valves for Gas Distribution Main and Regulator Station Piping: All manually operated shut-off valves shall have a minimum pressure rating of 150 psig.
 - 1. Ball Valves: AGA or CSA approved 150 psi to 300 psi. Valves shall be full bore type. Minimum bore size for full bore valves shall be 95 percent of the internal cross sectional area of pipe of the same nominal diameter.

Nominal Valve Size (Inches)	Torque (foot-pounds)
[3/4] [1] [1-1/2] [2]	[25]

- B. Gas Main Regulator Station: Shall include regulator valve, relief valve, strainer, regulator by-pass piping, and shut-off valves as indicated. All regulator station piping and all piping from the buried gas lines to the regulator station shall be steel piping as specified for gas distribution main piping. All regulator station piping, fittings and valves shall be welded joint [except where [flanged] [and] [threaded] joints are indicated]. All pipe and equipment supports shall be of non-combustible material. Regulator station shall be located [in an underground vault] [aboveground] as indicated.
 - 1. Regulator Valve: Shall have steel or ductile-iron body, and [flanged] [threaded] ends. The regulator valve shall conform to the indicated requirements, as to size, capacity, and reduction of indicated pressure. Provide overpressure protection to prevent gas pressure from exceeding the indicated value in accordance with *ANSI B31.8.
 - 2. Pressure relief valve shall be designed to prevent gas pressure from exceeding the indicated value, shall have sufficient capacity to prevent overpressuring the system, and shall be adjusted to ensure that [a pressure increase shall not cause the unsafe operation of any connected and properly adjusted gas utilization equipment in a low-pressure distribution system] [the maximum pressure shall not exceed the maximum allowable operating pressure plus 6 psig in a high pressure system]. Each pressure relief valve shall meet the performance standards set forth in *ASME PTC 25.3, and shall be steel or cast iron.
 - 3. Strainer shall be designed to remove particulate matter from the gas stream and shall have a steel or cast iron housing with a removable stainless steel strainer basket with a mesh sized to remove all particles that would interfere with regulator valve operation.

- 4. Shut-off valves shall be ball type.
 - C. Valve Boxes: Provide each valve on gas piping with a plastic or metal valve box of a size suitable for the valve. The valve box shall have a cover with the work "Gas" on it. The valve boxes shall be provided with covers.
 - D. Drips: Provide drip legs at each point of connection to equipment or lab valves.
- 2.5 GAS SERVICE LINE VALVES AND ACCESSORIES
- A. Shut-Off Valves: Shut-off valves for gas service line piping shall be ball valves, and shall be provided where indicated with a pressure rating of 150 psig and shall have threaded ends.
 - B. Emergency Shut Valves: Provide readily accessible emergency valves behind each individual work station or wall above centers.
- 2.6 CASING PIPE: Schedule 40 60 PVC. Provide PVC casing on all pipe below floors and in walls, sealed at outlets and vented to the atmosphere.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPELINES

- A. General Requirements:
 - 1. Pipe Laying and Jointing: Pipe, fittings, valves and accessories will be carefully inspected by the Contracting Officer or his authorized representative before and after installation and those found defective will be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition. Cut pipe accurately to measurements established at the site and work into place without springing or forcing. Replace any pipe or fitting that does not allow sufficient space for proper installation of jointing material with one of proper dimensions. Grade the pipe in straight lines, taking care to avoid the formation of any dips or low points. Support pipe at its proper elevation and grade, taking care to secure firm and uniform support. wood support blocking will not be permitted. The full length of each section of pipe and all fittings shall rest solidly on the pipe bed, with recesses excavated to accommodate joints and couplings. Provide anchors and supports where indicated. Close open ends of pipe at the end of each day's work temporarily with plastic end closures.
- B. Special Requirements for Installation of Steel Gas Main Piping:
 - 1. General: Install pipelines as specified herein and in accordance with the applicable requirements of *ANSI B31.8.
 - 2. Earthwork: Employ hand excavation within 5 feet of other underground structures. Special care shall be taken during earthwork operations not to damage the pipe.

3. Joints: Threaded joints shall have tapered threads, evenly cut, and shall be made with Underwriter's Laboratories approved graphite compound for gas service or with polytetrafluoroethylene tape conforming to *Mil. Spec. MIL-T-27730, applied to the male threads only. After cutting and before threading, ream pipe and remove burrs. Caulking of threaded joints to stop or prevent leaks will not be permitted.

C. Special Requirements for Installation of PE Gas Main Piping:

1. General: Install pipelines as specified herein and in accordance with the applicable requirements of *ANSI B31.8 and *ASTM D 2774 *ASTM D 3839. Maintain a minimum of 12 inches clearance between PE pipe and heating system piping.
2. Joints: Make joints for PE pipe for plastic pipe or tubing and fittings in accordance with *ANSI B31.8 and the recommendations of the manufacturer of the pipe or tubing and fittings for the material being used.

D. Special Requirements for Installation of Gas Service Piping:

1. General: Work shall include the connection to the building piping where the building piping has been installed. Where building piping has not been installed, terminate service lines with a temporary cap approximately five feet from the building line at a point directed by the Contracting Officer or his authorized representative. Installation shall be in accordance with the general requirements for installation of pipelines and with the applicable requirements of *ANSI B31.8. Installation of PE pipe or tubing shall further be in accordance with the applicable requirements of *ASTM D 2774.
2. Service Connections: Make all service connections at the top of the main, whenever the depth of the main is sufficient to allow top connections. When service connections cannot be made at the top of the main, they shall be made on the side of the main as close to the top as possible. Service connections shall not be made lower than the horizontal midpoint of the gas main. All service connections shall be installed in accordance with the applicable requirements of *ANSI B31.8.
3. Joints:
 - a. Steel Pipe: Make joints for steel service line piping as specified for steel distribution main piping.
 - b. PE Pipe or Tubing: Make joints for PE pipe or tubing and fittings in accordance with *ANSI B31.8 and the recommendations of the manufacturer of the pipe or tubing and fittings.

3.2 FIELD TESTS AND INSPECTIONS

- A. General: The Contractor shall obtain the services of the local gas distributing utility to provide a qualified gas pipeline inspector to perform inspections and witness all testing of the gas distribution system. The inspector shall provide a written report of his findings and recommendations at intervals as required to correct any deficiencies and after final

testing is complete do not coat, bury, cover or conceal joints and fittings until they have been inspected, tested and approved.

- B. Testing of Pipe Coatings: Check coated pipe for discontinuities in the coating with use of an electrical holiday detector at 10,000 volts prior to lowering into trench. Repair holidays in the pipe coating in accordance with paragraph titled "Application of Plastic Tape".
- C. Inspection and Testing of Welds: Inspect quality of welded joints visually on a sampling basis. Defective welds shall be repaired or removed from the line.
- D. Piping Strength and Tightness Tests: Test all gas distribution system piping for leaks with air at 100 psig after construction and before being placed in service. Disconnect piping under test from live gas piping systems. Where possible, test main and service pipe as a unit. Service line connections Pipe joints which are not included in the pressure test shall be given a leakage test at normal operating pressure after the piping system is placed in operation. Maintain a permanent written record of pressure test performed and furnish a copy to the Contracting Officer.
- E. Purge mains and service lines before placing in service in accordance with *ANSI B31.8, Section 841.275.

3.3 LABELING: Gas pipe shall be labeled every 10 ft and at every valve and at every branch.

3.4 FINAL CLEAN-UP: Upon completion of the work, remove and dispose of all excess spoil and leave the areas in a clean condition. Restore service line trenches as nearly as possible to the original appearance and condition.

END OF GAS DISTRIBUTION SYSTEM